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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/972,961 | 10/10/2001 | Naoyoshi Chino | Q66483 | 5751 |

7590 06/22/2004

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EXAMINER

PHAM, HAI CHI

ART UNIT PAPER NUMBER

2861

DATE MAILED: 06/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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TECH CENTER 2800

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|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 09/972,961 | Applicant(s) CHINO, NAOYOSHI | |
| | Examiner Hai C Pham | Art Unit 2861 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5 and 8-10 is/are rejected.
- 7) ☒ Claim(s) 3,4,6 and 7 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>3 & 4</u> . | 6) <input type="checkbox"/> Other: ____. |

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|-----------------------------------|---------------------------------------|--|---|-------------|
| Notice of References Cited | Application/Control No. 09/972,961 | | Applicant(s)/Patent Under Reexamination CHINO, NAOYOSHI | |
| | Examiner Hai C Pham | | Art Unit 2861 | Page 1 of 1 |

U.S. PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|--|-----------------|-----------------|----------------|
| | A | US-4,828,366 | 05-1989 | Nelson, Erik K. | 349/22 |
| | B | US- | | | |
| | C | US- | | | |
| | D | US- | | | |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

FOREIGN PATENT DOCUMENTS

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|--|-----------------|---------|-----------------|----------------|
| | N | JP 11242298 A | 09-1999 | Japan | NAKAYAMA et al. | G03B 27/32 |
| | O | | | | | |
| | P | | | | | |
| | Q | | | | | |
| | R | | | | | |
| | S | | | | | |
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NON-PATENT DOCUMENTS

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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|--|---|----------------------|--------------------------|--------|
| Substitute for form 1449 A & B/PTO | | Complete if Known | | |
| INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i> | | Application Number | 09/972,961 | |
| | | Confirmation Number | 5751 | |
| | | Filing Date | October 10, 2001 | |
| | | First Named Inventor | Naoyoshi CHINO | |
| | | Art Unit | 2673 2861 | |
| | | Examiner Name | NOT YET ASSIGNED H. Pham | |
| Sheet | 1 | of | Attorney Docket Number | Q66483 |

U.S. PATENT DOCUMENTS

| Examiner Initials* | Cite No. ¹ | Document Number | | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document |
|--------------------|-----------------------|-----------------|--------------------------------------|--------------------------------|---|
| | | Number | Kind Code ² (if known) | | |
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FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No. ¹ | Foreign Patent Document | | | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Translation ⁶ |
|--------------------|-----------------------|---------------------------|---------------------|--------------------------------------|--------------------------------|---|--------------------------|
| | | Country Code ³ | Number ⁴ | Kind Code ⁵ (if known) | | | |
| HP | | JP | 4-194832 | | 7/14/1992 | FUJI PHOTO FILM CO., LTD. | AbS |
| HP | | JP | 10-309829 | | 11/24/1998 | EASTMAN KODAK CO | AbS |
| HP | | JP | 11-242298 | | 9/7/1999 | SONY CORPORATION | AbS |
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OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No. ¹ | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city, and/or country where published. | Translation ⁶ |
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| Examiner Signature | H. Pham | Date Considered | 5/22/04 |
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ² See Kind Codes of USPTO Patent Documents at www.uspto.gov, MPEP 901.04 or in the comment box of this document. ³ Enter Office that issued the document, by the two-letter code (WIPO Standard ST. 3). ⁴ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶ Applicant is to indicate here if English language Translation is attached.



Substitute for Form 1449 A & B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Complete if Known

| | |
|------------------------|--------------------------|
| Application Number | 09/972,961 |
| Confirmation Number | 5751 |
| Filing Date | October 10, 2001 |
| First Named Inventor | Naoyoshi CHINO |
| Art Unit | 2673 2861 |
| Examiner Name | NOT YET ASSIGNED H. Phan |
| Attorney Docket Number | Q66483 |

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| Sheet | 1 | of | 1 |
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U.S. PATENT DOCUMENTS

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FOREIGN PATENT DOCUMENTS

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OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

[illegible]

| | | | |
|--------------------|-------------------|-----------------|---------|
| Examiner Signature | <i>Hatch Pham</i> | Date Considered | 5/22/04 |
|--------------------|-------------------|-----------------|---------|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ Applicant's unique citation designation number (optional). ²See Kind Codes of USPTO Patent Documents at www.uspto.gov, MPEP 901.04 or in the comment box of this document. ³Enter Office that issued the document, by the two-letter code (WIPO Standard ST. 3). ⁴For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁵Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. ⁶Applicant is to indicate here if English language Translation is attached.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

2. Claim 6 is objected to because of the following informalities:
 - Line 1, "according to claim 4" should read --according to claim 5--. Claim 6 is believed to be dependent from claim 5 instead of claim 4 since claim 6 refers to a limitation recited in claim 5, namely "the planar light source", which is not defined in claim 4.Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

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Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1 and 8-9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 3-5 of U.S. Patent No. 6,714,265. Although the conflicting claims are not identical, they are not patentably distinct from each other because the abovementioned claims of the U.S. Patent recites all the claimed elements recited in the corresponding claims of the current Application as mentioned above, including "a substantially parallel rays generating element arranged between the light source and the image display device", which describes in a slight difference in wording the "light linearizing device" recited in claim 1 of the current Application, wherein the light linearizing device is further defined as "wherein the light linearizing device converts the light from the light source into linear and substantially parallel rays such that the linear and substantially parallel rays can be incident on a display screen of the image display device".

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-2, 5, 8 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakayama et al. (JP 11-242298).

Nakayama et al., an acknowledged prior art, discloses a printing device comprising a light source (3), a light linearizing device (4) for linearizing light from the light source, a transmission type image display device (LCD 1), and a photosensitive recording medium (2), wherein the light source, the light linearizing device, the transmission type image display device and the photosensitive recording medium are arranged along a direction in which the light from the light source advances, and a display image transmitted through the image display device is transferred to the photosensitive image recording medium (Fig. 3), and wherein the light linearizing device converts the light from the light source into linear and substantially parallel rays such that the linear and substantially parallel rays can be incident on a display screen of the image display device and scans relatively the display screen of the image display device with the linear and substantially parallel rays (the grid 4 playing the role of converting the light source rays into linear and parallel rays, e.g., as compared to diffused rays, such that the overlapping of the stray rays on the adjacent pixels of the LCD 1 reduced and thus eliminating the overlapping of the pixels on the sensitive film 2) (see paragraphs [0029] to [0031] of the English Translation).

With regard to claims 2, 5, 8 and 10, Nakayama et al. further teaches:

- the light source being a linear source (fluorescent tubing 3) (paragraph [000018]) wherein the light linearizing device (grid 4) converts the light from the linear light source into the linear and substantially parallel rays,
- wherein the light source is a planar light source (the light from the light source being guided through the back light so as to form a planar source) (Figs. 3), and

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wherein the light linearizing device (grid 4) converts the light from the planar light source into the linear and substantially parallel rays,

- wherein the display image on the image display device and the image transferred to the photosensitive recording medium are substantially identical in size (the dimension of the dot on the sensitive film 2 having the magnitude of the pixel of the LCD 1) (paragraph [0025]),
- wherein the image display device is a transmissive type liquid crystal display (LCD 1).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Nakayama et al.

Nakayama et al. further discloses each pixel size of the image display device (LCD 1) being 0.5 mm, and thus fails to teach the pixel size being not more than 0.2 mm. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the LCD display device with a pixel size less than 0.2 mm, since it has been held that discovering an optimum value of a result

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effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

9. Claims 3-4 and 6-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: the primary reason for the indication of the allowability of claim 3 is the inclusion therein, in combination as currently claimed, of the limitation that "the linear light source and the light linearizing device are integrally combined with each other and the image display device and the photosensitive recording medium are also integrally combined with each other such that the linear light source and the light linearizing device can be moved along a side of the transmission type image display device in a relative relation to the image display device and the photosensitive recording medium", which is not found taught or fairly suggested by the prior art made of record considered alone or in combination.

The primary reason for the indication of the allowability of claim 6 is the inclusion therein, in combination as currently claimed, of the limitation that "the light linearizing device is movable along a side of the planar light source", which is not found taught or fairly suggested by the prior art made of record considered alone or in combination.

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The primary reason for the indication of the allowability of claim 7 is the inclusion therein, in combination as currently claimed, of the limitation that "the light linearizing device has a plurality of through-holes arranged in a direction perpendicular to a direction in which said light linearizing device is moved, and wherein said plurality of through-holes have a circular or polygonal cross section and a thickness not less than three times the diameter or equivalent diameter of said plurality of through-holes", which is not found taught or fairly suggested by the prior art made of record considered alone or in combination.

Pertinent Prior Art

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nelson (U.S. 4,828,366) discloses a laser-addressable liquid crystal display device having a mark positioning layer in which through-holes are formed such that the light passing through the layer is converted into as linear and parallel rays to expose the liquid crystal display device.


Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



HAI PHAM
PRIMARY EXAMINER

May 24, 2004

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 許出願公開番号

特開平11-242298

(43) 公開日 平成11年(1999) 9月7日

(51) IntCl⁶

G 0 3 B 27/32
27/02

識別記号

F I

G 0 3 B 27/32
27/02

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審査請求 未請求 請求項の数 2 O L (全 6 頁)

(21) 出願番号 特願平10-45485

(22) 出願日 平成10年(1998) 2月26日

(71) 出願人 000002185

ソニー株式会社

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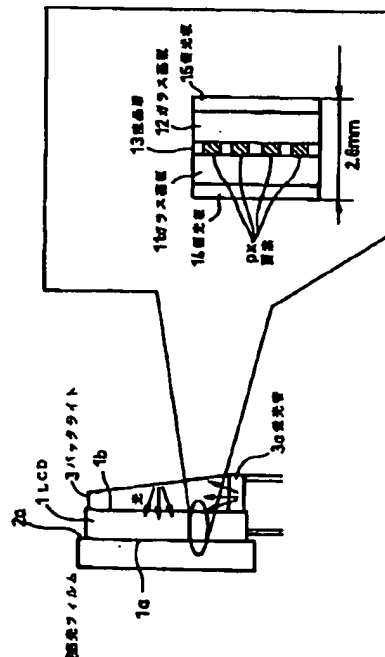
(74) 代理人 弁理士 松隈 秀盛

(54) 【発明の名称】 印写装置

(57) 【要約】

【課題】 画像を感光フィルムにプリントする方式を採用したビデオプリンタ等の印写装置であって、一層の小型軽量化、低消費電力化及び低コスト化を可能にしたものを提供する。

【解決手段】 透過型の液晶ディスプレイ1の表示面1aに感光フィルム2を密着させ、液晶ディスプレイ1の背面1b側に光源3を設け、この光源3を点灯することにより、液晶ディスプレイ1に表示される画像を感光フィルム2に印写する。



【特許請求の範囲】

【請求項1】 透過型の液晶ディスプレイの表示面に感光フィルムを密着させ、前記液晶ディスプレイの背面側に光源を設け、前記光源を点灯することにより、前記液晶ディスプレイに表示される画像を前記感光フィルムに印写することを特徴とする印写装置。

【請求項2】 請求項1に記載の印写装置において、前記光源と前記液晶ディスプレイとの間に格子を設けることにより、前記光源からの光の拡散を抑制することを特徴とする印写装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、画像を感光フィルムに印写する印写装置に関し、特に、小型軽量化や低コスト化等を図ったものに関する。

【0002】

【従来の技術】例えばビデオカメラ（カメラ一体型のビデオテープレコーダ）等で撮影した画像をプリントするための印写装置（いわゆるビデオプリンタ）としては、旧来は、昇華型熱転写方式を採用したものが主流であった。しかし、この昇華型熱転写方式のビデオプリンタには、1枚のプリントが完了するまでに比較的長時間を要するという不都合や、機械的構造が複雑なのでサイズや重量が大きい（従って携帯に適さない）という不都合や、ドラムを帯電させるために大きな電力を要するという不都合がある。

【0003】そこで近年、インスタント感光フィルムに画像をプリントする方式を採用したビデオプリンタも提案されるに至っている。図5は、本出願人が提案済みのこうしたビデオプリンタの光学系の一例（特許出願公開番号特開平6-284367号公報に掲載のもの）を示す図である。

【0004】このビデオプリンタでは、光源23を兼ねた画像表示手段であるCRT21の表示面が、筐体50の底面に向けて配設されている。ビデオカメラ等から再生した画像がこのCRT21に表示され、その画像光は、CRT21の表示面と対向してほぼ45度傾けて配設された第1の鏡24aで反射される。第1の鏡24aで反射された画像光は、光学ブロック71で集束及び拡散された後、フィルタ及びシャッタ74を介して第2の鏡25に入射する。第2の鏡25は筐体50の底面に対して第1の鏡24aと対向するように傾斜して配設されており、この鏡25で反射された画像光は、第3の鏡26に入射する。

【0005】第3の鏡26は、筐体50のパネル51と平行に配設されたトレイ154内のフィルムバック22に入ったインスタント感光フィルムの感光面に対して傾斜して配設されると共に、その反射面が第2の鏡25と対向するように配設されている。この第3の鏡26で反

射された画像光が、フィルムバック22のインスタント感光フィルムの感光面に結像してこの感光面を露光することにより、CRT21に表示された画像（ビデオカメラ等から再生した画像）がインスタント感光フィルムにプリントされる。尚、図5に描かれたその他の部位については、本発明とは直接関連しないので説明を省略する。

【0006】こうしたビデオプリンタによれば、昇華型熱転写方式のビデオプリンタと比較して、プリント時間の短縮化が実現されると共に、或る程度の小型軽量化及び低消費電力化が実現される。

【0007】

【発明が解決しようとする課題】しかるに、図5に例示したようなビデオプリンタでは、画像表示手段であるCRTからの画像光をインスタント感光フィルムの感光面に結像させるために、光学ブロックや鏡といった光学部品が必須であると共に適当な長さの焦点距離を確保しなければならぬので、小型軽量化に限界があった。

【0008】また、ビデオプリンタに対しては一層の低コスト化も要求されているが、こうした光学部品の存在は低コスト化を促進する上での妨げにもなっていた。

【0009】また、このビデオプリンタでは、フィルタ及びシャッタを始めとする各種の機械的動作を行う部品とそれらを動作させるモータとが必須であるので、機械的構造の単純化による小型軽量化や低消費電力化にも限界があった。

【0010】本発明は上述の点に鑑みてなされたもので、画像を感光フィルムにプリントする方式を採用したビデオプリンタ等の印写装置であって、一層の小型軽量化、低消費電力化及び低コスト化を可能にしたものを提供しようとするものである。

【0011】

【課題を解決するための手段】本発明に係る印写装置は、透過型の液晶ディスプレイの表示面に感光フィルムを密着させ、この液晶ディスプレイの背面側に光源を設け、この光源を点灯することにより、液晶ディスプレイに表示される画像を感光フィルムに印写することを特徴としている。

【0012】この印写装置には、画像表示手段として透過型の液晶ディスプレイが設けられており、この液晶ディスプレイの表示面に感光フィルムが密着されている。そして、この液晶ディスプレイの背面側に設けられた光源を点灯することにより、光源からの光が液晶ディスプレイを透過して感光フィルムに照射されるので、液晶ディスプレイに表示された画像が感光フィルムに印写される。

【0013】このように、この印写装置によれば、画像表示手段である液晶ディスプレイに感光フィルムを密着させてこの感光フィルムに画像を印写するようにしているので、図5に例示したビデオプリンタのように光学部

品を設けたり適当な長さの焦点距離を確保したりすることが全く不要である。従って、一層の小型軽量化及び低コスト化が可能になる。

【0014】また、この印写装置において必要な機械的動作を行う部品としては、最低限、感光フィルムを遮光して保存し、感光フィルムを液晶ディスプレイの表示面に密着させ、感光フィルムに現像液を塗布するための部品があれば足りる。従って、この印写装置によれば、図5に例示したビデオプリンタと比較して機械的構造が大幅に単純化するので、この点からも一層の小型軽量化が可能になる。

【0015】また、この印写装置において最低限電気的に動作させなければならないものは、光源及び液晶ディスプレイのみである。従って、この印写装置によれば、図5に例示したビデオプリンタのようにモータが必要なものと比較して消費電力も大幅に減少する。

【0016】尚、この印写装置において、光源と液晶ディスプレイとの間に格子を設けるようにすることが一層好適である。そうすることにより、光源からの光が平行光でない場合にも、光源と液晶ディスプレイとの間の距離を短くしたまま、光源からの光の拡散を抑制して（光源からの光を平行光に近づけて）鮮明な画像を感光フィルムに印写できるようになる。従って、更に一層の小型化が可能になる。

【0017】

【発明の実施の形態】図1は、本発明に係る印写装置の主要部の構成の一例を示す。この印写装置では、図の左側に示すように、画像表示手段としての透過型のLCD（液晶ディスプレイ）1に対して、インスタント感光フィルム2が、その感光面2aをLCD1の表示面1aと対向させて密着されている。感光フィルム2としては、このように密着される直前まで遮光して保存されていたものが用いられていることはもちろんである。

【0018】LCD1の背面1b側には、バックライト3が設けられている（図では便宜上LCD1とバックライト3とも密着して描いているが、実際には、後述するようにLCD1とバックライト3との間には或る程度の距離をあけることが望ましい）。バックライト3は、LCD用の一般的なバックライトである。バックライト3は、図では蛍光管3aを用いたものとして描かれているが、例えばLEDや分散形ELを用いたものであってもよい。

【0019】LCD1は、例えばカラーTFT（薄膜トランジスタ）液晶ディスプレイのようなアクティブマトリクス駆動方式の液晶ディスプレイであり、同図の右側に拡大図として示すように、それぞれ表示電極、共通電極を形成したガラス基板11、12の間に液晶層13が封入されると共にガラス基板11、12の外側にはそれぞれ偏光板14、15が貼り付けられており、この液晶層13のうち個々のスイッチング素子に対応する部分が

それぞれ画素 $p \times$ を構成している。LCD1の厚さ（偏光板14の外側面と偏光板15の外側面との間の距離）は、一例として2.8mmである。

【0020】この印写装置で画像をプリントする際の動作の一例を説明すると、次の通りである。LCD1を駆動回路（図示せず）で駆動させ、バックライト3を点灯制御回路（図示せず）で所定時間（例えば数十ミリ秒）点灯させる。これにより、バックライト3からの光がLCD1を透過して感光フィルム2に照射されるので、LCD1に表示された画像（例えばビデオカメラから再生してLCD1に供給された映像信号に基づく画像）が感光フィルム2に印写される。

【0021】ところで、バックライト3からの光は平行光ではない。図2は、バックライト3を仮に点光源とみなして、バックライト3からの光がLCD1を透過する様子の一例を示す（同図AはLCD1・バックライト3間の距離 L が比較的小さい場合を、同図Bはこの距離 L が比較的大きい場合をそれぞれ示している）。

【0022】バックライト3からの光が平行光ではないことから、バックライト3からLCD1に達した光はLCD1の表面で広がりをもつ。その結果、LCD1の各画素 $p \times$ を通過した光も広がるので、図2Aのように距離 L が比較的小さい場合には、感光フィルム2上では隣合う画素 $p \times$ からの光が交わってしまうことがある。こうした光の交わりは、感光フィルム2に印写される画像のボケ（不鮮明化）の原因となると考えられる。

【0023】これに対し、図2Bのようにこの距離 L を大きくすると、LCD1の表面での光の広がりが小さくなることにより、各画素 $p \times$ を通過した光の広がりも小さくなるので、感光フィルム2上で隣合う画素 $p \times$ からの光が交わらなくなる（あるいはこの交わりが少なくなる）。従って、感光フィルム2に印写される画像のボケが解消あるいは低減される。

【0024】この距離 L の大きさとボケの度合いとの具体的な相関関係は種々の条件によって変化し得るが、本出願人が、ひとつの実験として、LCD1とバックライト3との間に矩形の中空の筒を介在させ、LCD1に表示した直径0.5mmのドットの画像を感光フィルム2に印写した際の感光フィルム2上のドットの横方向、縦方向の寸法の測定値を示すと、下記の通りである。

【0025】(a) $L=18\text{mm}$ の場合

横方向の寸法：1.20mm

縦方向の寸法：0.90mm

(b) $L=46\text{mm}$ の場合

横方向の寸法：0.85mm

縦方向の寸法：0.57mm

(b) $L=86\text{mm}$ の場合

横方向の寸法：0.73mm

縦方向の寸法：0.51mm

【0026】この実験結果にも、距離 L が大きくなるに

つれて感光フィルム2上のドットの寸法がLCD1上の画像の大きさに近づいていく（即ち感光フィルム2に印写される画像のボケが低減される）ことが現れている。

【0027】そこで、図1の印写装置では、LCD1・バックライト3間の距離を、感光フィルム2に印写される画像のボケが人間の視覚で認識されない程度になるように設定することが望ましい。

【0028】次に、図3は、本発明に係る印写装置の主要部の構成の別の一例を示すものであり、図1と同一部分には同一符号を付して重複説明を省略する。この印写装置では、LCD1とバックライト3との間に格子4が設けられると共に、この格子4とLCD1との間にスペーサ5が設けられている。

【0029】格子4は、多数の貫通孔4aを格子状に形成したものであり、バックライト3からの光がこれらの貫通孔4aを通過することにより、バックライト3からの光の拡散を抑制する（この光を平行光に近づける）役割を果たす。

【0030】スペーサ5は、例えば矩形形状の中空の筒から成るものである。格子4を通過した光は、完全な平行光にはならないので、スペーサ5を通過するうちに幾分拡散する。従って、格子4を通過したばかりの光は、各貫通孔4aを仕切る枠組の部分が影になっているのに対し、スペーサ5を通過した光は、こうした枠組による影のない（あるいは影が弱まった）ものになる。スペーサ5は、このことを利用して、格子4の枠組の形の像が感光フィルム2に焼きついてしまうことを防止する役割を果たす。

【0031】図4は、前出の図2と同様にバックライト3を点光源とみなして、バックライト3からの光が格子4を経てLCD1を透過する様子の一例を示す。バックライト3からの光が格子4により平行光に近づけられるので、LCD1の表面での光の広がりが小さくなる。これにより、感光フィルム2上で隣合う画素pxからの光が交わらないようになる（あるいはこの交わりが少なくなる）ので、感光フィルム2に印写される画像のボケが解消あるいは低減される。

【0032】この印写装置で画像をプリントする際の動作は、図1の印写装置について既に説明したのと同じである。但し、この印写装置では、バックライト3からの光が格子4により平行光に近づけられるので、LCD1・バックライト3間の距離を小さくしても、感光フィルム2に印写される画像のボケが、図1の印写装置で印写されたものよりも低減されるようになる。

【0033】本出願人が、ひとつの実験として、格子4の長さを10mm、貫通孔4aの寸法を5mm角とし、スペーサ5の長さを20mmとし、LCD1・バックライト3間の距離Lをこれらの格子4及びスペーサ5の長さの合計である30mmとして、LCD1に表示した直径0.5mmのドットの画像を感光フィルム2に印写し

た際の感光フィルム2上のドットの横方向、縦方向の寸法の測定値を示すと、下記の通りである。

横方向の寸法：0.67mm

縦方向の寸法：0.63mm

【0034】この実験結果を前述の図1の印写装置についての実験結果と比較してみると、ボケの低減の度合いが、図1の印写装置において $L=86\text{mm}$ と設定した場合に匹敵していることがわかる。また、貫通孔4aの寸法を5mm角よりも小さくすれば、距離Lを30mmよりも更に短く設定しても、同程度の結果が得られるものと考えられる。

【0035】以上のような図1、図3の例の印写装置によれば、画像表示手段であるLCD1に感光フィルム2を密着させてこの感光フィルム2に画像を印写するようにしているので、図5に例示したビデオプリンタのように光学部品を設けたり適当な長さの焦点距離を確保したりすることが全く不要である。従って、一層の小型軽量化及び低コスト化が可能になる。

【0036】また、これらの印写装置において必要な機械的動作を行う部品としては、最低限、感光フィルム2を遮光して保存し、感光フィルム2をLCD1の表示面1aに密着させ、感光フィルム2に現像液を塗布するための部品があれば足りる。従って、この印写装置によれば、図5に例示したビデオプリンタと比較して機械的構造が大幅に単純化するので、この点からも一層の小型軽量化が可能になる。

【0037】また、これらの印写装置において最低限電気的に動作させなければならないものは、光源であるバックライト3及びLCD1のみである。従って、この印写装置によれば、図5に例示したビデオプリンタのようにモータが必要なものと比較して消費電力も大幅に減少する。

【0038】また、特に図3の例の印写装置によれば、LCD1・バックライト3間の距離を図1の印写装置よりも短くしたまま、鮮明な画像を感光フィルムに印写できるようになる。従って、更に一層の小型化が可能になる。

【0039】尚、以上の例の印写装置において、LCD1とバックライト3との間に、バックライト3からの光の量を調整するための減光フィルタを設けるようにしてもよい。

【0040】また、以上の例では、LCD1の背面側に一般的なLCD用のバックライト3を設けているが、その他の適宜の光源（望ましくはなるべく平行光に近い光を発生する光源）をLCD1の背面側に設けるようにしてもよい。

【0041】また、以上の例の印写装置は、ビデオプリンタに適用することができるだけでなく、LCDに表示可能な画像をプリントするあらゆる用途に適用することができる。

【0042】また、本発明は、以上の例に限らず、本発明の要旨を逸脱することなく、その他様々の構成をとることができることはもちろんである。

【0043】

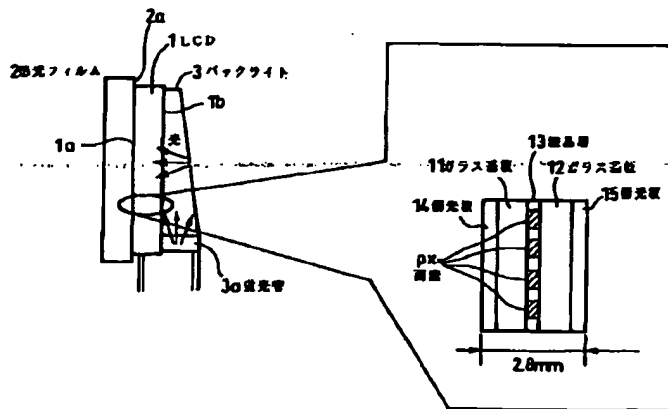
【発明の効果】以上のように、本発明に係る印写装置によれば、液晶ディスプレイに感光フィルムを密着させてこの感光フィルムに画像を印写するようにしたことにより、光学部品を設けたり適当な長さの焦点距離を確保したりすることが全く不要になり、且つ、機械的構造が大幅に単純化すると共に消費電力も大幅に減少する。従って、印写装置を一層小型軽量化してその携帯性を向上させることができると共に、その一層の低コスト化を実現できる。

【0044】また、光源と液晶ディスプレイとの間に格子を設けるようにした場合には、光源と液晶ディスプレイとの間の距離を短くしたまま、光源からの光の拡散を抑制して鮮明な画像を感光フィルムに印写できるようになるので、更に一層の小型化を実現できる。

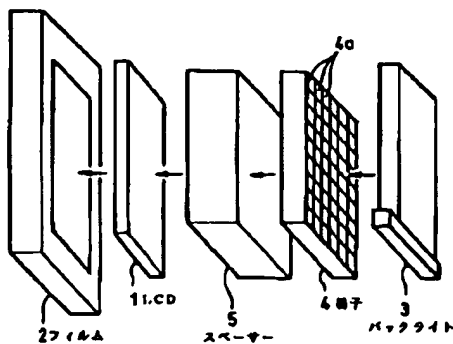
【図面の簡単な説明】

【図1】本発明に係る印写装置の主要部の構成の一例を

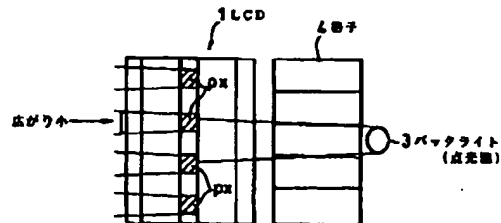
【図1】



【図3】



【図4】



示す側面図である。

【図2】図1の印写装置においてバックライト3からの光がLCD1を透過する様子の一例を示す側面図である。

【図3】本発明に係る印写装置の主要部の構成の別の一例を示す斜視図である。

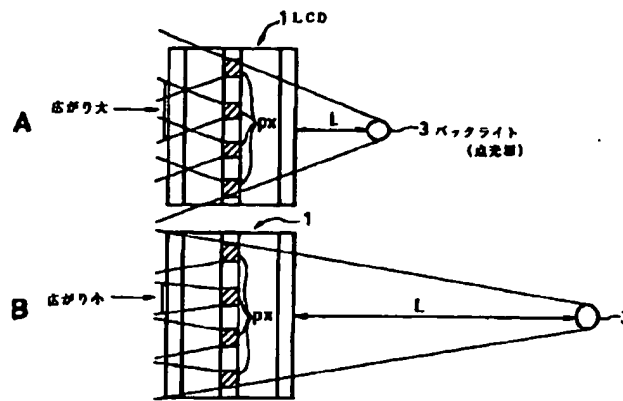
【図4】図3の印写装置においてバックライト3からの光がLCD1を透過する様子の一例を示す側面図である。

10 【図5】従来の印写装置の構成の一例を示す斜視図である。

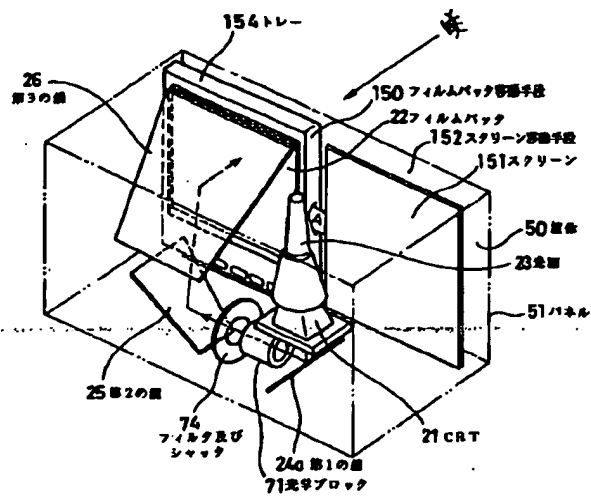
【符号の説明】

1…液晶ディスプレイ、 1a…液晶ディスプレイの表示面、 1b…液晶ディスプレイの背面、 2…インスタント感光フィルム、 2a…インスタント感光フィルムの感光面、 3…バックライト、 3a…蛍光管、 4…格子、 4a…格子の貫通孔、 5…スペーサ、 11、12…ガラス基板、 13…液晶層、 14、15…偏光板、 px…画素

【図2】



【図5】



PATENT ABSTRACTS OF JAPAN

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(71)Applicant : **SONY CORP**

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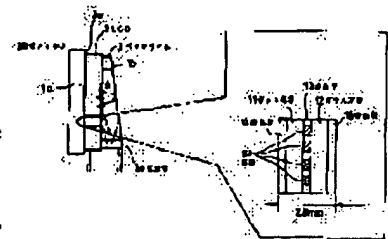
(72)Inventor : **NAKAYAMA KATSUYUKI
NOGUCHI SACHIYO**

(54) PRINTING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To make a device small in size, light in weight, low in power consumption and low in cost by bringing photosensitive film into contact with the display surface of a transmission type liquid crystal display(LCD), turning on a light source on the back side for the LCD and printing a picture displayed on the LCD on the photosensitive film.

SOLUTION: In this printing device, the instant photosensitive film 2 is brought into contact with the transmission type LCD 1 functioning as a picture display means so that its photosensitive surface 2a may be opposed to the display surface 1a of the LCD 1. A backlight 3 is provided on the back side of the LCD 1. In the case of printing the picture in the device, the LCD 1 is driven by a driving circuit and the backlight 3 is turned on for a specified time by a lighting control circuit. Thus, light from the backlight 3 is transmitted through the LCD 1 and irradiates the film 2, so that the picture (for instance, the picture based on a video signal reproduced and supplied from a video camera to the LCD 1) supplied to the LCD 1 is printed on the film 2.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

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[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to what attained formation of small lightweight, low cost-ization, etc. especially about the **** equipment which **** an image to a sensitive film.

[0002]

[Description of the Prior Art] For example, as **** equipment (***** video printer) for printing the image photoed with the video camera (video tape recorder of camera one apparatus) etc., what adopted the sublimation mold hot printing method was in use conventionally. However, there are un-arranging [of taking long duration to complete the print of one sheet comparatively], un-arranging [that size and weight are large (therefore, it is not suitable for a cellular phone)], since mechanical structure is complicated, or un-arranging [of requiring power big in order to electrify a drum] in the video printer of this sublimation mold hot printing method.

[0003] Then, the video printer which adopted the method which prints an image on an instant sensitive film has also come to be proposed in recent years. Drawing 5 is drawing in which these people show an example (thing found in patent application public presentation number JP,6-284367,A) of the optical system of such a video printer [finishing / a proposal].

[0004] In this video printer, the screen of CRT21 which is the image display means which served as the light source 23 is arranged towards the base of a case 50. The image reproduced from the video camera etc. is displayed on this CRT21, and that image light counters with the screen of CRT21, and is reflected by 1st mirror 24a which leaned about 45 degrees and was arranged. After converging and diffusing the image light reflected by 1st mirror 24a with the optical block 71, incidence of it is carried out to the 2nd mirror 25 through a filter and a shutter 74. It inclines and the 2nd mirror 25 is arranged so that it may counter with 1st mirror 24a to the base of a case 50, and it carries out incidence of the image light reflected in this mirror 25 to the 3rd mirror 26.

[0005] The 3rd mirror 26 is arranged so that the reflector may counter with the 2nd mirror 25, while being inclined and arranged to the sensitization side of the instant sensitive film included in the film pack 22 in the tray 154 arranged in parallel with the panel 51 of a case 50. When the image light reflected in this 3rd mirror 26 carries out image formation to the sensitization side of the instant sensitive film of the film pack 22 and exposes this sensitization side, the image (image reproduced from the video camera etc.) displayed on CRT21 is printed on an instant sensitive film. In addition, about the part of others which were drawn on drawing 5, since it is not directly connected with this invention, explanation is omitted.

[0006] According to such a video printer, while shortening of print time amount is realized as compared with the video printer of a sublimation mold hot printing method, the formation of small lightweight and low-power-izing of a certain extent are realized.

[0007]

[Problem(s) to be Solved by the Invention] However, in a video printer which was illustrated to drawing 5, since the focal distance of suitable die length had to be secured while optics, such as an optical block and a mirror, were indispensable in order to make the sensitization side of an instant sensitive film carry out image formation of the image light from CRT which is an image display means, the limitation was in small lightweight-ization.

[0008] Moreover, much more low cost-ization was demanded from the video printer, and existence of such an optic had also become hindrance when promoting low cost-ization.

[0009] Moreover, in this video printer, since the components which perform various kinds of mechanical movements including a filter and a shutter, and the motor which operates them were indispensable, there was a limitation also in the formation of small lightweight and low-power-izing by simplification of mechanical structure.

[0010] This invention was made in view of the above-mentioned point, are **** equipments, such as a video printer which adopted the method which prints an image on a sensitive film, and tends to offer what enabled much more formation of small lightweight, low-power-izing, and low cost-ization.

[0011]

[Means for Solving the Problem] The **** equipment concerning this invention is characterized by ****(ing) the image displayed on a liquid crystal display to a sensitive film by sticking a sensitive film to the screen of the liquid crystal display of a transparency mold, preparing the light source in the tooth-back side of this liquid crystal display, and turning on this light source.

[0012] The liquid crystal display of a transparency mold is prepared in this **** equipment as an image display means, and it is stuck to the sensitive film by the screen of this liquid crystal display. And since the light from the light source penetrates a liquid

crystal display and is irradiated by the sensitive film by turning on the light source prepared in the tooth-back side of this liquid crystal display, the image displayed on the liquid crystal display is ****(ed) by the sensitive film.

[0013] Thus, since according to this **** equipment a sensitive film is stuck to the liquid crystal display which is an image display means and it is made to **** an image to this sensitive film, it is completely unnecessary to prepare an optic like the video printer illustrated to drawing 5, or to secure the focal distance of suitable die length. Therefore, much more formation of small lightweight and low cost-ization are attained.

[0014] Moreover, as components which perform required mechanical movement in this **** equipment, a sensitive film is shaded and saved and a sensitive film is stuck to the screen of a liquid crystal display, and at worst, if there are components for applying a developer to a sensitive film, it is sufficient. Therefore, since mechanical structure is sharply simplified as compared with the video printer illustrated to drawing 5 according to this **** equipment, small lightweight-ization much more also from this point is attained.

[0015] Moreover, it is only the light source and the liquid crystal display which must be electrically operated at worst in this **** equipment. Therefore, according to this **** equipment, as compared with what has a required motor, power consumption also decreases sharply like the video printer illustrated to drawing 5.

[0016] In addition, in this **** equipment, it is much more suitable to prepare a grid between the light source and a liquid crystal display. Also when the light from the light source is not parallel light by doing so, with the distance between the light source and a liquid crystal display shortened, diffusion of the light from the light source is controlled and a clear (bringing the light from the light source close to parallel light) image can be ****(ed) in a sensitive film. Therefore, still much more miniaturization is attained.

[0017]

[Embodiment of the Invention] Drawing 1 shows an example of the configuration of the principal part of the **** equipment concerning this invention. With this **** equipment, as shown in the left-hand side of drawing, to LCD (liquid crystal display) 1 of the transparency mold as an image display means, the instant sensitive film 2 makes that sensitization side 2a counter with screen 1a of LCD1, and it is stuck to it. Of course, what was saved by shading as a sensitive film 2 until just before being stuck in this way is used.

[0018] The back light 3 is formed in the tooth-back 1b side of LCD1 (although LCD1 and a back light 3 are stuck and drawn for convenience by a diagram, it is desirable to open the distance of a certain extent between LCD1 and a back light 3 in fact, so that it may mention later). A back light 3 is a common back light for LCD. Although the back light 3 is drawn as what used fluorescence tubing 3a by a diagram, LED and distributed type EL may be used for it, for example.

[0019] It is the liquid crystal display of a active-matrix drive method like a color TFT (thin film transistor) liquid crystal display, and as shown in the right-hand side of this drawing as an enlarged drawing, while the liquid crystal layer 13 is enclosed among the glass substrates 11 and 12 which formed the display electrode and the common electrode, respectively, polarizing plates 14 and 15 are stuck on the outside of glass substrates 11 and 12, respectively, and the part corresponding to each switching element of LCD1 constitutes Pixel px among this liquid crystal layer 13, respectively. The thickness (distance between the lateral surface of a polarizing plate 14 and the lateral surface of a polarizing plate 15) of LCD1 is 2.8mm as an example.

[0020] It is as follows when an example of the actuation at the time of printing an image with this **** equipment is explained. LCD1 is made to drive in a drive circuit (not shown), and predetermined time (for example, dozens mses) lighting of the back light 3 is carried out in a lighting control circuit (not shown). Since the light from a back light 3 penetrates LCD1 and is irradiated by the sensitive film 2 by this, the image (for example, image based on the video signal which was reproduced from the video camera and supplied to LCD1) displayed on LCD1 is ****(ed) by the sensitive film 2.

[0021] By the way, the light from a back light 3 is not parallel light. Drawing 2 considers temporarily that a back light 3 is the point light source, and an example to which the light from a back light 3 seems to penetrate LCD1 is shown (the distance L between LCD1 and a back light 3 shows the case of being comparatively small, and, as for this drawing A, this distance L shows the case of being comparatively large, respectively, as for this drawing B).

[0022] Since the light from a back light 3 is not parallel light, the light which reached LCD1 from the back light 3 has breadth on the front face of LCD1. Consequently, since the light which passed each pixel px of LCD1 also spreads, when comparatively small, on a sensitive film 2, the light from the ***** pixel px may cross [distance L] like drawing 2 A. It is thought that the intersection of such a light causes dotage (indistinct-izing) of the image ****(ed) by the sensitive film 2.

[0023] On the other hand, if this distance L is enlarged like drawing 2 B, since the breadth of the light which passed each pixel px when the breadth of the light in the front face of LCD1 became small will also become small, the light from the ***** pixel px ceases (or this intersection decreases) to cross on a sensitive film 2. Therefore, dotage of the image ****(ed) by the sensitive film 2 is canceled or reduced.

[0024] Although the concrete correlation of the magnitude of this distance L and the degree of dotage may change with various conditions. These people make the cylinder of rectangle-like hollow intervene between LCD1 and a back light 3 as one experiment. It is as follows when the measured value of the dimension of the longitudinal direction of the dot on the sensitive film 2 at the time of ****(ing) the image of a dot with a diameter of 0.5mm displayed on LCD1 to a sensitive film 2 and a lengthwise direction is shown.

[0025] (a) the case of L= 18mm -- lateral dimension: -- dimension [of 1.20mm lengthwise direction]: -- the case of 0.90mm(b) L=46mm -- lateral dimension: -- dimension [of 0.85mm lengthwise direction]: -- the case of 0.57mm(b) L=86mm -- lateral dimension: -- dimension [of 0.73mm lengthwise direction]: -- 0.51mm [0026] Also in this experimental result, what (that is,

dotage of the image ****(ed) by the sensitive film 2 is reduced) the dimension of the dot on a sensitive film 2 approaches the magnitude of the image on LCD1 for has appeared as distance L becomes large.

[0027] Then, it is desirable to set up the distance between LCD1 and a back light 3 with the **** equipment of drawing 1, so that dotage of the image ****(ed) by the sensitive film 2 may become extent which is not recognized with human being's vision.

[0028] Next, drawing 3 shows another example of the configuration of the principal part of the **** equipment concerning this invention, gives the same sign to the same part as drawing 1, and omits duplication explanation. With this **** equipment, while a grid 4 is formed between LCD1 and a back light 3, the spacer 5 is formed between this grid 4 and LCD1.

[0029] A grid 4 plays the role (this light is brought close to parallel light) which controls diffusion of the light from a back light 3, when much through tube 4a is formed in the shape of a grid and the light from a back light 3 passes such through tube 4a.

[0030] A spacer 5 consists of the cylinder of the hollow of the shape for example, of a rectangle. Since it does not become a perfect parallel light, the light which passed the grid 4 is diffused a little, while passing a spacer 5. Therefore, as for the light which passed the spacer 5, the light which just passed the grid 4 does not have a shadow by such framework to the part of the framework which divides each through tube 4a being a shadow (or the shadow became weaker). A spacer 5 plays the role which prevents that the image of the form of the framework of a grid 4 is burned on a sensitive film 2 using this.

[0031] Drawing 4 considers that a back light 3 is the point light source like above-mentioned drawing 2, and an example to which the light from a back light 3 seems to penetrate LCD1 through a grid 4 is shown. Since the light from a back light 3 is brought close to parallel light in a grid 4, the breadth of the light in the front face of LCD1 becomes small. Thereby, dotage of the image ****(ed) by the sensitive film 2 is canceled or reduced by that which the light from the ***** pixel px ceases (or this intersection decreases) to cross on a sensitive film 2.

[0032] The actuation at the time of printing an image with this **** equipment is the same as having already explained the **** equipment of drawing 1. However, with this **** equipment, since the light from a back light 3 is brought close to parallel light in a grid 4, even if it makes small distance between LCD1 and a back light 3, dotage of the image ****(ed) by the sensitive film 2 comes to be reduced rather than what was ****(ed) with the **** equipment of drawing 1.

[0033] These people use the dimension of 10mm and through tube 4a as 5mm angle for the die length of a grid 4 as one experiment. Set the die length of a spacer 5 to 20mm, and the distance L between LCD1 and a back light 3 as 30mm which is the sum total of the die length of these grids 4 and a spacer 5. It is as follows when the measured value of the dimension of the longitudinal direction of the dot on the sensitive film 2 at the time of ****(ing) the image of a dot with a diameter of 0.5mm displayed on LCD1 to a sensitive film 2 and a lengthwise direction is shown.

The dimension of the dimension: 0.67mm lengthwise direction which is a longitudinal direction: 0.63mm [0034] It turns out that it matches when the degree of reduction of dotage sets up this experimental result with $L = 86\text{mm}$ in the **** equipment of drawing 1 as compared with the experimental result about the **** equipment of above-mentioned drawing 1. Moreover, if the dimension of through tube 4a is made smaller than 5mm angle, even if it sets up distance L still shorter than 30mm, it will be thought that a comparable result is obtained.

[0035] Since according to above drawing 1 and the **** equipment of the example of drawing 3 a sensitive film 2 is stuck to LCD1 which is an image display means and it is made to **** an image to this sensitive film 2, it is completely unnecessary to prepare an optic like the video printer illustrated to drawing 5, or to secure the focal distance of suitable die length. Therefore, much more formation of small lightweight and low cost-ization are attained.

[0036] Moreover, as components which perform required mechanical movement in these **** equipments, a sensitive film 2 is shaded and saved and a sensitive film 2 is stuck to screen 1a of LCD1, and at worst, if there are components for applying a developer to a sensitive film 2, it is sufficient. Therefore, since mechanical structure is sharply simplified as compared with the video printer illustrated to drawing 5 according to this **** equipment, small lightweight-ization much more also from this point is attained.

[0037] Moreover, what must be electrically operated at worst in these **** equipments is only the back light 3 and LCD1 which are the light source. Therefore, according to this **** equipment, as compared with what has a required motor, power consumption also decreases sharply like the video printer illustrated to drawing 5.

[0038] Moreover, according to the **** equipment of the example of drawing 3, a clear image can be especially ****(ed) now in a sensitive film, making distance between LCD1 and a back light 3 shorter than the **** equipment of drawing 1. Therefore, still much more miniaturization is attained.

[0039] In addition, you may make it prepare the extinction filter for adjusting the quantity of light of the light from a back light 3 between LCD1 and a back light 3 in the **** equipment of the above example.

[0040] Moreover, although the common back light 3 for LCD to the tooth-back side of LCD1 is formed in the above example, you may make it prepare the other proper light sources (light source which generates the light near parallel light desirable if possible) in the tooth-back side of LCD1.

[0041] Moreover, the **** equipment of the above example is applicable to all the applications that it is not only applicable to a video printer, but print the image which can be displayed on LCD.

[0042] Moreover, this invention of the ability of various configurations to be taken is natural, without deviating from the summary of not only the above example but this invention.

[0043]

[Effect of the Invention] As mentioned above, by according to the **** equipment concerning this invention, sticking a sensitive film to a liquid crystal display, and having been made to **** an image to this sensitive film, while it completely becomes

unnecessary to prepare an optic or to secure the focal distance of suitable die length and mechanical structure is simplified sharply, power consumption also decreases sharply. Therefore, while being able to form **** equipment into small lightweight further and being able to raise the portability, the much more low cost-ization is realizable.

[0044] Moreover, since diffusion of the light from the light source is controlled and a clear image can be ****(ed) in a sensitive film, with the distance between the light source and a liquid crystal display shortened when a grid is prepared between the light source and a liquid crystal display, still much more miniaturization is realizable.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation showing an example of the configuration of the principal part of the **** equipment concerning this invention.

[Drawing 2] It is the side elevation showing an example to which the light from a back light 3 seems to penetrate LCD1 in the **** equipment of drawing 1 .

[Drawing 3] It is the perspective view showing another example of the configuration of the principal part of the **** equipment concerning this invention.

[Drawing 4] It is the side elevation showing an example to which the light from a back light 3 seems to penetrate LCD1 in the **** equipment of drawing 3 .

[Drawing 5] It is the perspective view showing an example of the configuration of conventional **** equipment.

[Description of Notations]

1 [13 -- Liquid crystal layer, / 14 15 -- Polarizing plate, / px -- Pixel] -- Liquid crystal display 11 12 -- Glass substrate 1a -- The screen of a liquid crystal display 1b -- Tooth back of a liquid crystal display 2 -- Instant sensitive film 2a -- Sensitization side of an instant sensitive film 3 -- Back light 3a -- Fluorescence tubing 4 -- Grid 4a -- Through tube of a grid 5 -- Spacer

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] **** equipment characterized by ****(ing) the image displayed on said liquid crystal display by sticking a sensitive film to the screen of the liquid crystal display of a transparency mold, preparing the light source in the tooth-back side of said liquid crystal display, and turning on said light source to said sensitive film.

[Claim 2] **** equipment characterized by controlling diffusion of the light from said light source in **** equipment according to claim 1 by preparing a grid between said light sources and said liquid crystal displays.

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